simultaneous bilateral knee arthroplasty. Patients were assessed (i) immediately prior to surgery, (ii) 12 months following surgery, and (iii) 6-7 years following surgery. At the pre-operative and 12 months post-operative assessments, patients were assessed on the Oxford-12 Knee Score, the Knee Society Knee Score, the SF-12, the presence or absence of contralateral knee pain and body mass index. At 6-7 years post-operative assessment, patients were asked about any surgery or pain in each knee since their total knee arthroplasty. A Classification and Regression Tree was developed to identify factors associated with a higher likelihood of progression to bilateral total knee arthroplasty within 7 years of the index surgery. The strongest prediction model of who progressed to bilateral knee arthroplasty included three classification levels – pain in the contralateral knee prior to the index surgery, body mass index, and Mental Component Score on SF12 measure prior to the index surgery. None of the measures from the 12 month assessment improved the prediction model. Patients who reported an absence of pain in the contralateral knee prior to the index surgery had a 20% chance of progressing to bilateral total knee arthroplasty within 7 years. Patients who reported the presence of pain in the contralateral knee prior to the index surgery, and had a body mass index greater than 30.7 had a 70% chance of progressing to bilateral knee arthroplasty. Patients with pain in the contralateral knee but with a body mass index of less than 30.7 were just as likely to progress to bilateral knee surgery as those with high body mass index if they had a Mental Component Score of greater than 55. In this cohort, one in three total knee arthroplasty patients progressed to bilateral total knee arthroplasty within 7 years of the index surgery. Progression to bilateral knee arthroplasty was predicted by 3 key outcomes – the presence of pain in the contralateral knee, body mass index and SF12. These outcomes were measured prior to the index surgery, and can therefore help to inform expectations of outcome, and planning for multiple surgeries.

Category: Knee - Arthroplasty

Patello-Femoral Forces in the Native and Replaced Knee Are Significantly Different. An Insight to Anterior Knee Pain?

Abstract ID# 22791

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Summary: Currently there is no method of characterising the patellofemoral loading occurring dynamically in the native knee or during knee replacement. We describe a novel apparatus to dynamically measure patella loading in the native and replaced knee, offering the possibility of reducing AKP by more accurate balancing and replication of the patellofemoral forces.

Data: 
Introduction. Twenty percent of patients report dissatisfaction following TKR, 45% of this group characterise anterior knee pain (AKP) as a source of their discomfort. Therefore, there is interest in studying the ‘Third Space’ or patellofemoral joint and the pressures and function of the surrounding extensor hood. Currently there is no method of characterising the patellofemoral loading occurring dynamically in the native knee or during knee replacement. We describe a novel apparatus to dynamically measure patella loading in the native and replaced knee, and the effect of varying the depth and angle of patella resection. Method. A sensory apparatus was attached to the patella undersurface recording pressures through a range of full flexion in the patellofemoral joint in four native cadaveric knees (unpreserved, pelvis to toe preparations). Sensors were positioned at superior, inferior, medial and lateral positions on the patella surface.Sixteen range of motion studies from full extension to full extension were completed. A TKR was then performed under optimal conditions with robot assistance (MAKO, Stryker inc.) to control accuracy and reproducibility between the four cadavers. In this way surgeon variability was reduced. The patellofemoral sensor was reintroduced and the measurements repeated. The effect of different depths and angles of patella resection were noted. Reliability and reproducibility was shown in an in vitro test rig and verified in the four cadaveric studies. Sensor data was compared for all 4 quadrants using ANOVA with alpha error 0.05. Results. A clear, reproducible pattern of patellofemoral loading occurs in the native cadaveric knee. Following TKR this was significantly changed in both pattern and magnitude (p<0.01). Changing the depth and angle of patella resection altered patellofemoral loading (p< 0.05). In some cases, by the surgeon selecting appropriate depths and angles of patellofemoral resection to address aspects of the abnormal patterns observed after TKR, it was possible to achieve the same patterns and magnitude of patellofemoral forces observed in the native knee therefore replicating natural patellofemoral loading. Conclusions. A characteristic pattern of patellofemoral loading is shown in the native knee which is significantly altered following TKR, suggesting abnormal loading of the patella and extensor hood apparatus may be responsible in AKP seen after TKR. It has been possible to characterize for instance, the lateral loading that occurs in lateral maltracking and subsequently address and reduce the overload by altering the depth and angle of subsequent patella ressections. Altering patella resection depth and angles subsequently allows loading in TKR to approach that of the native knee, offering the possibility of reducing AKP by more accurate balancing and replication of the patellofemoral forces.

Category: Knee - Arthroplasty

Is Patellar Resurfacing in Total Knee Arthroplasty Associated with a Higher Incidence of Patella Baja?

Abstract ID# 23388

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Summary: Patients who undergo patellar resurfacing during total knee arthroplasty do not have a higher incidence of patella baja when compared to those who do not undergo patellar resurfacing. Data: PURPOSE: While total knee arthroplasty (TKA) is a highly successful procedure, it is not without potential complications. Patella baja is a complication that results in an abnormally low-lying patella with associated anterior knee pain, crepitus, and decreased range of motion. To date, no studies have explored the association between patellar resurfacing and the incidence of patella baja. The aim of this study was to compare rates of patella baja between unresurfaced patellas and resurfaced patellas in patients undergoing TKA. METHODS: A retrospective review was conducted at a single institution of patients who underwent TKA between October 2009 and January 2020. Patients were included if they had at least one preoperative radiograph and one-year follow-up radiograph. Patients with a history of prior knee trauma or inflammatory arthropathy were excluded. Blackburne-Peel (BPR) and Insall-Salvati ratios (ISR) were measured on preoperative and one-year postoperative radiographs. An ISR of less than 0.8 in addition to a BPR of less than 0.5 was defined as patella baja whereas a BPR of less than 0.5 alone was defined as pseudopatella baja. Statistical analysis was performed using a linear model analysis of variance and Fishers exact test. RESULTS: 318 TKAs underwent radiographic evaluation, 176 resurfaced and 142 unresurfaced patellas. Of the resurfaced patients 4% (7/176) were diagnosed with true patella baja whereas of the unresurfaced patellas 5.6% (8/142) were found to have true patella baja. Of the resurfaced patellas 8% (14/176) were found to have pseudopatella baja compared to 7% (10/142) in the unresurfaced group. Patellar resurfacing was not associated with a higher incidence of patella baja (p=0.60) or pseudopatella baja (p=0.83). Lower preoperative ISRs (p=0.04) and BPRs (0.03) were highly predictive of a higher incidence of patella baja post TKA. CONCLUSION: The added trauma of patellar resurfacing in TKA is not associated with a higher incidence of patella baja in TKA when compared to unresurfaced patellas. Lower preoperative ISRs and BPRs are highly predictive of a higher incidence of postoperative patella baja.

Category: Knee - Arthroplasty

Intra-Operative Change of Fixed Flexion Deformity in Robotic-Arm Assisted Unicompartmental Knee Arthroplasty

Abstract ID# 23580

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Summary: Intra-operative change of fixed flexion deformity (FFD) is well documented. This study aimed to evaluate changes in FFD occurring during robotic-assisted unicompartmental knee arthroplasty (UKA). Methods: A consecutive series of 21 unicompartmental knee arthroplasties performed by a single surgeon were selected for review. The robotic arm was positioned at a 110º flexion with the knee in slight varus/valgus. Once the trial components were deemed satisfactory, the robotic arm was locked in place. The knee was then flexed to 90º and the difference in arc of motion was noted. Results: The mean range of motion (ROM) at the time of surgery was 124º (110º flexion) and 80º (90º flexion). The mean arc of motion change from 110º flexion to 90º flexion was 14º (9º extension). Conclusion: The robotic-assisted unicompartmental knee arthroplasty results in significant flexion loss during surgery. This should be considered when planning the postoperative rehabilitation.
Image-free Robotic-Assisted Total Knee Arthroplasty Improves the Rotational Mismatch Between Femoral and Tibial Components, but Not Forgotten Joint Score 12 using three-dimensional computed tomography Measurements: A Consecutive Case Control Study

Abstract ID# 21801
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Summary:
In robotic-assisted (RA) TKA, the accuracy of femoral component rotation placement was improved and there were fewer cases of the rotational mismatch, although, forgotten joint score-12 was lower in RA-TKA compared to conventional TKA.

Data:
Background: The primary aim of this study was to compare the postoperative short-term patient reported outcome measures (PROMs) and component accuracy in conventional jig-based total knee arthroplasty (Conv-TKA) versus a robotic-assisted TKA (RA-TKA) using three-dimensional computed tomography (3DCT) measurements. Methods: This retrospective, consecutive case control trial included 83 patients with varus osteoarthritis of the knee undergoing Conv-TKA versus RA-TKA using bi-crateate stabilized TKA (BCS) (Journey/BCS, Smith & Nephew, Inc. Memphis, TN, USA). PROMs (2011 Knee Society Score (KSS), FJS-12, patella score) were compared in patients who had been postoperative for at least 1 year and less than 2 years. Hip-knee-ankle (HKA) angle, component alignment (1989 knee society knee and function score. Postoperative PROMs (pain, patient satisfaction, patient expectation, advanced activities in 2011 KSS) and patella score were not significantly different between the groups, but FJS-12 was significantly improved in Conv-TKA than in RA-TKA (p<0.01). Although there were no significant differences in postoperative HKA angle, a, b, d angles, and rotational mismatch between the two groups were compared using 3DCT measurements. Results: There were no statistically significant differences in the postoperative factors between the groups: age at surgery, BMI, preoperative range of motion (ROM), HKA angle, and 1989 Knee society knee and function score. Postoperative PROMs (pain, patient satisfaction, patient expectation, advanced activities in 2011 KSS) and patella score were not significantly different between the groups, but FJS-12 was significantly improved in Conv-TKA than in RA-TKA (p<0.01). Although there were no significant differences in postoperative HKA angle, a, b, d angles, and rotational angle, the absolute value of femoral rotational angle and rotational mismatch were significantly smaller in RA-TKA group than in Conv-TKA group (p<0.01, p<0.01). Conclusions RA-TKA did not improve FJS-12 compared to Conv-TKA, but improved accuracy of femoral component rotational position and rotational mismatch.

Category: Knee - Arthroplasty

Initial Experience With a Novel Extended-Release, Dual-Acting Local Topical Anesthetic in TKA

Abstract ID# 22356
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Summary:
In this initial study, a topical anesthetic option appears to have lower cost, faster application, and similar or superior pain management effects compared to a long-lasting bupivacaine injection.

Data:
Introduction: The benefits of peri-articular injections for initial pain management after primary TKA are reflected by its nearly universal use. However, the many different cocktails currently available illustrates that there is no single solution to local pain management. In addition, peri-articular injections are limited by cost, consistent efficacy, and required specific technique in delivery. A novel needle-free topical dual-acting local anesthetic consisting of bupivacaine and meloxicam may provide an alternative option to the traditional limitations of peri-articular injections. Methods: Two-hundred consecutive primary TKA patients were evaluated prospectively with application of this dual-acting local topical anesthetic, and compared to the previous 200 patients where a long-lasting periartricular injection was used. Patients were evaluated for pain scores, opioid use, therapy goals, and need for rescue medication for 72 hours after surgery. Results: There were no intraoperative events with anesthetic application in either group. Application of the needle-free anesthetic was faster, compared to the periartricular injection group (1 vs 4 min, p<0.05). Pain scores between groups were similar upon entrance to the PACU after surgery. Patients receiving the topical anesthetic had less pain at discharge (p<0.05), 17% reduction in opioid use during the hospital admission (p<0.05), and fewer refill requests after discharge. Fewer patients had severe pain, and patients tolerated more PT after surgery compared to the control group. Incidence of adverse events were similar for the two groups. Discussion: This extended-release dual-acting local anesthetic showed improved analgesia for the first 72 hours after primary TKA compared to a peri-articular injection protocol. This reduction in pain led to a lower requirement of opioids in this same period. In this initial study, this topical anesthetic option appears to have lower cost, faster application time, and similar or superior pain management effects compared to a long-lasting bupivacaine peri-articular injection.

Category: Knee - Arthroplasty

Outcomes of Calipered Mechanically Aligned Versus Calipered Restricted Kinematically Aligned Bilateral Total Knee Arthroplasty - A Randomized Controlled Trial

Abstract ID# 22468
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Summary:
No difference in patient reported outcome measures at 6 months follow-up between restricted kinematically aligned and mechanically aligned bilateral simultaneous Total knee arthroplasty.

Data:
Introduction: A recent focus on total knee arthroplasty (TKA) is primarily